DOCUMENT RESUME

ED 304 918 FL 017 875

AUTHOR Sondak, Norman E.; And Others
TITLE Expert Systems--The New International Language of Business.
PUB DATE Apr 88
NOTE 26p.; In: Proceedings of the Seventh Annual Eastern Michigan University Conference on Languages for Business and the Professions (see FL 017 839).
PUB TYPE Guides - Non-Classroom Use (055) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Computer Software; Data Processing; English; *Expert Systems; *French; Futures (of Society); *International Trade; Language Processing; *Machine Translation; User Needs (Information)

ABSTRACT

A discussion of expert systems, computer programs designed to simulate human reasoning and expertise, begins with the assumption that few business educators understand the impact that expert systems will have on international business. The fundamental principles of the design and development of expert systems in business are outlined, with special emphasis placed on the linguistic aspects and structure of the knowledge base needed to support an expert system. The organization and architecture of a typical expert system is illustrated, and the computer software necessary to automate the production of expert systems is discussed. An example demonstrates how an expert system originally developed in English can be modified for French-speaking users. The translation process involves two simple steps. A set of translation rules convert the external language-dependent input variables into the external knowledge-dependent functional variables, and then display statements are translated. The structure, simplicity, and directness of expression of the information in the knowledge base reduces the effort needed in these language transformations. It is concluded that just as FORTRAN and COBOL have become international languages of data processing and scientific computing, expert systems can be an effective means of capturing complex business knowledge and offering this knowledge to an international community of users. (MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED304918

EXPERT SYSTEMS - THE NEW INTERNATIONAL LANGUAGE OF BUSINESS

by

Norman E. Sondak and Alexis Koster
Information and Decision Systems Department
College of Business Administration
San Diego State University
San Diego, CA 92182-0127

and

Eileen M. Sondak
Department of Business
Grossmont College
El Cajon, CA 92020

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

G VOGHT

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

In: Proceedings of the Seventh Annual Eastern Michigan University Conference on Languages for Business and the Professions.

FL017875

ABSTRACT

EXPERT SYSTEMS - THE NEW INTERNATIONAL LANGUAGE OF BUSINESS

Expert systems have received considerable attention in the data processing community. But few business educators understand the basic concepts of expert systems or can appraise the tremendous impact they will have on 'nternational business. This presentation covers the fundamental principles of the design and development of expert systems in business. Special emphasis is placed on the linguistic aspects and structure of the knowledge base needed to support an expert system. The organization and architecture of typical expert systems is illustrated. Computer software to automate the production of expert systems is discussed.

Included, is an example demonstrating how an expert system, originally developed in English, can be modified for French speaking users. The translation process involves two simple steps. A set of "translation rules" convert the external language dependent input variables into the internal knowledge-dependent functional variables, and then the display statements are translated. The structure, simplicity, and directness of expression of the information in the knowledge base reduces the effort needed in these language transformations.

The presentation concludes that just as COBOL and FORTRAN have become international languages of data processing and scientific computing, expert systems can be an effective means of capturing complex business knowledge and offering it to an international community of users.

INTRODUCTION

Expert systems have been termed the most critical development in computer science to emerge in the past decade [1]. Yet very few people understand what expert systems are, how they work, and why they are so important.

Expert systems are computer programs designed to simulate human reasoning and expertise. Therefore, expert systems can be applied to a wide spectrum of real life problems. Expert system applications have already ranged from medical systems to IRS tax auditing. Simply stated, if the problem can be specified in terms of rules and facts, then an expert system can be used. [2]

THE ORIGIN OF EXPERT SYSTEMS

Expert systems are an evolutionary development of Artificial Intelligence research. The objective of Artificial Intelligence (AI) research is to produce computer programs that can simulate intelligent human behavior. AI was pioneered and developed at major university laboratories in MIT, Stanford, Cal Berkeley, Carnegie-Mellon, and Yale. [3]

At first, AI researchers attempted to computerize logical problem solving techniques. Highly structured board games, like chess and checkers and the restricted venue of mathematical theorem proving, provided an ideal environment in which early AI researchers could develop new programming paradigms and test automated problem solving methodology.

There were some spectacular initial successes. Allen Newell and Herbert Simon developed a program that could solve puzzles and prove mathematical theorems. A checkers program that eventually defeated the world champion human player was written. AI chess programs played well enough to challenge expert players. Amid this general euphoria, extravagant claims were made for the future of AI [2].

However, despite these early triumphs, fundamental problems remained. AI researchers discovered it was extremely difficult to translate the experience gained in working with problem solving in these restricted environments, with their clearly defined rules, to the complexities of real world situations, with all their complexities and ambiguities. It was soon realized that a human uses many different types of knowledge and experience in solving even the most elementary practical problem.

However, the science of medicine was one very important area of human endeavor in which, despite all the real world contradictions and difficulties, problem solving was firmly rooted in logic and reasoning. Indeed, a sub-specialty of AI, Medical Artificial Intelligence (MAI), was defined as the use of AI techniques and computational support to simulate the mental processes a physician exerts in the treatment of patients. Research in MAI focused on what was required for the computer to

capture and simulate the expertise of the physician. [2,4]

KNOWLEDGE-BASED SYSTEMS

It required a dramatic new approach to move AI problem solving techniques into the real world. In 1967, a team headed by Edward Feigenbaum developed a program called DENDRAL. [5] DENDRAL used data about the fragmentation of an organic molecule provided by a mass spectrometer to infer the structure of the molecule. The program derived its power not from automating logical functions, as so many AI programs had done before, but from processing tremendous volumes of information about the spectra of thousands of different chemical compounds and the rules about the ways compounds break up in a mass spectrometer. Without that additional knowledge of rules, the sheer number of possible combinations made the problem too cumbersome to compute. DENDRAL was highly successful, and is still in use today.

Feigenbaum pointed out that real world problem solving comes not only from logic and reasoning, but also from the proper employment of enormous amounts of specific knowledge about a subject. In essence, a human expert uses compiled data and years of experience encapsulated as "rules of thumb" or heuristics, as well as traditional logic to solve problems. Therefore, like DENDRAL, intelligent problem solving programs would have to process this type of "knowledge" to successfully emulate human experts.

EXPERT SYSTEMS

The next step toward simulation of human expertise also was made at Stanford. [2,3,4] MYCIN was developed to diagnose bacterial infections of the blood and prescribe drug therapy. The goal was to have MYCIN act as an "intelligent consultant" to physicians.

The "knowledge" about bacterial infections was stored within MYCIN as a series of English language IF/THEN/ ELSE "production" rules. These rules appeared in the form:

Rule 50:

IF 1) the infection is primarily bacteremia, and
2) the the site of the culture is sterile, and
3) the suspected port of entry of the organism is the gastro-intestinal tract
THEN there is suggestive evidence (0.7) that the identity of the organism is bactercoides.

The IF portion of the rule is called the "premise" and the THEN portion of the rule is called the "conclusion." As in classical logic, when the premise is true, then the facts contained in the conclusion can be used to find a solution to a problem.

Because medicine rarely has clear cut "yes or no" cases, MYCIN rules had to be probabilistic. A "Certainty Factor" (0.7 in the above rule) could be included to indicate the degree of belief in the applicability of the rule to the given situation.

A likelihood calculus was developed to give a good estimate of final truth, based on these Certainty Factors. Through this device, MYCIN was able to arrive at a correct result with incomplete and only partially correct information.

The complete collection of rules about the subject was called a knowledge base. The MYCIN knowledge base contained about 550 rules.

MYCIN could also "explain" its reasoning processes. Physicians could interrogate the system to see the rules used by MYCIN and to "trace" the "logic" behind "advice."

Even more important, when matched against physicians with an actual set of case studies, MYCIN's performance was outstanding.[3] For the first time, a program successfully simulated a human expert in a real world field. Naturally, it was called an "expert system."

A powerful new AI tool was developed as a result of the Stanford research effort.

THE STRUCTURE OF AN EXPERT SYSTEM

The developers realized that the MYCIN program could be logically divided into three separate parts. The first of these was the knowledge base. This portion contained the "expertise" needed to solve problems in the form of IF/THEN/ELSE rules. The next part of the program was the section for testing the rules to find those applicable to each particular case. Since this testing followed the logical rules of inference, it was named the "inference engine." The last part was the "user interface." It handled all the various system communication tasks, such as displaying results, obtaining any additional information from the user, and updating or modifying the knowledge base. [2,3,4]

INFERENCE ENGINE

The inference engine was designed to carry out the logical processes needed to offer sound advice. This was done by "backward" chaining through the knowledge base. In backward chaining, the inference engine first assumes a specific "goal state" or final diagnosis. The knowledge base is searched to find a rule with that diagnosis as a conclusion. The premise of that rule is examined, and then the inference engine attempts to find a rule in which that premise appears as rule conclusion. As this cycle is repeated, the inference engine "chains" through the knowledge base, as long as the assumed diagnosis is consistent with the "initial state" -- the actual symptoms and test results

reported thus far for the patient.

If the symptoms matched the disease, then the diagnosis was correct. If not, then a new diagnosis consistent with the data collected to that point is assumed and the process repeated.

Backward chaining is like first looking at the answers on a multiple choice test and then testing each answer to determine if it meets the question data. Backward chaining is most effective when there are few goal states and many initial states. We use backward chaining to solve many everyday problems.

The other approach is called "forward chaining." Here, each possible initial state is probed in turn, until a successful (matching goal state) solution is obtained. Forward chaining is most effective when there are few initial states and many goal states -- a situation that is relatively rare with real-life practical problems.

EXPERT SYSTEM SHELLS

One of the most profound discoveries of the MYCIN team was that the knowledge base could be stripped out of the MYCIN program and that the user interface and inference engine portions would stand alone to form an "expert system shell." Now, new expert systems could be built by other subject matter experts by simply creating a new knowledge base and inserting it in the shell. EMYCIN was the name given to the expert system shell created from the MYCIN program. The savings in development time and effort to be gained by using the expert system shell were tremendous.

However, MYCIN was written in a specialized AI programming language called LISP. LISP programs were slow in execution on computer systems of that time. [2] Large LISP expert systems, like MYCIN, required large and expensive mainframe computers, if consultations were to be completed in any reasonable time period.

Special LISP machines and workstations were developed for AI applications in general. These computers used the LISP language as basic machine instructions. They could execute AI programs many times faster than general purpose computers. However, LISP machines were costly, and few organizations could support specialized computers restricted to only AI applications.

However, as research successes continued to mount, business became aware of the commercial potential of expert systems. A number of commercially successful expert systems were developed by the early '80s.

PERSONAL COMPUTER EXPERT SYSTEM DEVELOPMENT TOOLS

When the business computer environment changed, with the introduction of the IBM PC, expert system shells were developed

for personal computers. The initial packages were still costly and the PC was slow in executing expert system programs. However, with the next generation of Intel 80286-based computers, desktop expert systems became practical.

The cost for expert system development tools also has dropped steadily. There are now a number of sophisticated expert system development tools (ESDT) available in a price range from several thousand down to several hundred dollars.

A major price break occurred in early 1987, when Paperback Software delivered its VP-EXPERT system. At a retail cost of about $130, VP-EXPERT offered tools and capabilities previously found only with ESDT packages at many times that price. [6]

The package received outstanding reviews, and within three months of availability, Paperback Software announced that more units of VP-EXPERT were delivered than all of the other PC ESDT packages combined.

The combination of a low-cost, powerful development tool and the ubiquitous personal computer placed expert systems within the reach of everyone in business.

EXPERT SYSTEMS AS COMMUNICATION TOOLS

The use of expert systems is normally considered to offer the following advantages:

1. Continuous availability -- If the computer is available, the expert system is available.

2. Can be readily replicated -- An expert system can easily be copied; a human expert cannot.

3. Consistent advice -- An expert system will provide consistent, uniform advice.

4. Provides an explanation -- An expert system can explain the line of reasoning used to arrive at a solution. The user is free to accept or reject that reasoning for a particular case.

5. Increase capacity -- Expert systems can add rules to increase the scope of the problem domain.

6. Function in hostile environments -- Embedded expert systems can be used wherever a computer can operate.

7. Captures knowledge and expertise -- The problem solving ability of the human expert encoded into the knowledge base remains with the organization even after the human expert leaves.

This last benefit is particularly germane to this paper because of the knowledge representation techniques used with expert systems. The highly structured representation of

knowledge makes the translation of the knowledge into other languages far easier than the usual freeform text. In addition, the use of linguistic aspects of knowledge transfer are focused in user interface data gathering messages and explanatory remarks associated with rules. These two properties, along with formal encoding of expertise, afford expert systems one additional and very significant advantage -- that of minimal language dependency.

Indeed, it may be fair to call expert systems a new medium for the exchange of knowledge between countries and cultures. The three following examples are designed to demonstrate this "lingua franca" aspect of expert systems.

EXPERT SYSTEMS EXAMPLES USING VP-EXPERT

In order to concentrate on the linguistic aspects of expert systems, we selected a very familiar problem domain for this expert system example. In this way, the rules in knowledge bases of the expert systems are readily understandable. However, the principles outlined here would remain applicable for far more complicated cases. In fact, the specialized vocabularies of many technical areas of business and science are already internationalized. Therefore, the modifications to expert systems operating in those domains might even be less severe than for the example that follows.

The expert system for this example was prepared with VP-EXPERT using an IBM PC compatible computer. The knowledge base was developed and entered using a standard word processing package (WordStar 4). The rule premises contain conditional logical expressions. The rule conclusions indicate the action to be taken if the premise is true. CNF values are used to indicate the Certainty Factors associated with values used in a particular rule. The semicolon [;] is a delimiter used by VP-EXPERT to indicate the end of a rule.

VP-EXPERT allows each of the rules to be augmented with WHY clauses that explain the reason the rule is used for a given situation. ASK statements are also utilized to provide information to the user on how to enter data. In addition, there are a number of procedural statements and declarations to assist the program in managing the display of questions and results. These keywords are all in technical English.

The example is an expert system designed to act as a "fashion advisor." Table 1 shows the knowledge base for this expert system in English. Table 2 shows the changes to the knowledge base required to create a French version of the expert system. Figures 1 and 2 show expert system consultations in English and French, respectively.

The translation technique is a simple two stage process. First, a set of stereotyped translation "rules" are created for the internal knowledge base variables. These rules simply translate the names of the variables from one language to the

other. The variable names for the conversion were the same as in the original knowledge base, with the suffix FRENCH added to indicate that they were translated to the French.

Next, the displays (DISPLAY, ASK, and CHOICES) statements are converted from the source language (English, in this case) to the target language (French, in this case). The high degree of structure in the knowledge base makes this a straightforward task. Again, the same basic variable names were used with the suffix FRENCH added.

The construction of the translation "rules" can even be further simplified by using Induction Tables for each variable. An Induction Table can be used to describe the variable-value relationships for variables in a knowledge base. Table 3 shows the Induction Tables needed to translate the "Fashion" knowledge base.

VP-EXPERT will automatically produce a set of IF/THEN rules from an Induction Table. These rules can be inserted into the source knowledge base to reduce much of the clerical work involved in converting a knowledge base to another language.

CONCLUSION

The price of sophisticated expert system development tools like VP-EXPERT is now at the level of electronic spreadsheets. Anyone with a personal computer can create effective expert systems. As the above examples illustrate, once the knowledge and expertise is captured within the knowledge base of the expert system -- in a structured and stereotyped format -- it can be readily converted for use in another country with a different language.

There is little doubt that encoding knowledge in this format presents international business with a unique opportunity for transfer and dissemination of expertise. Now, business and language educators must be in a position to understand expert system applications and illustrate their use so that the next generation of international executives and managers are as comfortable with the transfer of knowledge and decision making processes as they are with the transfer of data processing and spreadsheet applications.

BIBLIOGRAPHY

[1] Settanni, Joseph Andrew, "Artificial intelligence: next evolution of software." The Office, v105, February, 1987, p40-42.

[2] Mishkoff, H., Understanding Artificial Intelligence, Texas Instruments Learning Center, Dallas, TX, 1985

[3] Clancey, W., and Shortliffe, E., Eds., Readings in Medical Artificial Intelligence, Addison-Wesley, 1984

[4] Buchanan, B., and Shortliffe, E., Eds., Rule-Based Expert Systems, Addison-Wesley, 1984

[5] Schutzer, D., Artificial Intelligence: An Applications-oriented Approach, Van Nostrand Reinhold, 1987

[6] VP-EXPERT, Paperback Software International, 2830 Ninth Street, Berkeley, CA 94710.

[7] Sondak, N., Briggs, R., "Expert Systems - The new business simulation tool," ABSEL 88, San Diego, CA, March 1988

TABLE 1

ENGLISH VERSION OF A DRESS FOR SUCCESS FASHION EXPERT SYSTEM KNOWLEGE BA

```
ACTIONS
DISPLAY"
                    FRENCH FASHION EXPERT SYSTEM

          THIS EXPERT SYSTEM WILL HELP YOU DRESS FOR SUCCESS
                BY SELECTING A COLOR COORDINATED OUTFIT



Please press any key to continue~"
CLS
          FIND SHOES
          FIND TIE;


RULE BROWN
IF        SUIT=Brown AND
          SHIRT=Tan OR
          SHIRT=White AND
          SHOES=Brown
THEN      TIE=Brown
CLS
DISPLAY"
You have decided to dress in brown hues.  We recommend a brown or
tan tie to continue the color theme.  However, a touch of color
at the throat can be very effective, so a yellow or turquois
tie would also be striking.  If this is the second or third time
this week you are using the same color scheme, alternate the
choice of ties with your outfit."
;
RULE BLUE
IF        SUIT=Blue AND
          SHIRT=Blue OR
          SHIRT=White AND
          SHOES=Black
THEN      TIE=Blue
CLS
DISPLAY"
You have decided to dress in blue.  We recommend a blue tie to
continue the color theme.  A maroon tie is another good choice.
However, a touch of color at the throat can also be very
effective, so a red or pink tie would also be striking.  If this
is the second or third time this week you are using the same
color scheme, alternate the choice of ties with your outfit."
;

RULE GRAY
IF        SUIT=Grey AND
          SHIRT=White AND
          SHOES=Black
THEN      TIE=Red
```

```
CLS
DISPLAY"
You have decided to dress in grey.  We recommend a grey tie to
continue the color theme.  A maroon tie is another good choice.
However, a touch of color at the throat can also be very
effective, so a red or pink tie would also be striking.  If this
is the second or third time this week you are using the same
color scheme, alternate the choice of ties with your outfit."
;
RULE WRONG_SHOES_BLACK
IF      SUIT=Brown AND
        SHOES=Black
THEN    WRONG=yes
CLS
DISPLAY"
You have decided to dress in brown hues.  We recommend brown
rather than black shoes to continue the color theme for your
outfit."
;
RULE WRONG_SHOES_BROWN
IF      SUIT=Blue OR
        SUIT=Gray AND
        SHOES=Brown
THEN    WRONG=yes
CLS
DISPLAY"
We recommend black shoes rather than brown to continue the color
theme for your outfit."
;
RULE STOP
IF WRONG=yes
THEN TIE=STOP
;
ASK SUIT: "What color suit are you going to wear?";
CHOICES SUIT: Brown,Blue,Grey;

ASK SHIRT: "What color shirt have you selected?";
CHOICES SHIRT: Tan,Blue,White;

ASK SHOES: "What color shoes have you selected";
CHOICES SHOES: Brown,Black;
```

TABLE 2 -- THE FRENCH VERSION OF THE SAME KNOWLEDGE BASES

```
ACTIONS
DISPLAY"
                EXPERT SYSTEME POUR LA MODE FRANCAISE

CE SYSTEME EXPERT VOUS AIDERA A CHOISIR, POUR LE SUCCES DE VOS ENTREPRIS
UN ENSEMBLE AUX COULEURS ASSORTIES



PRESSER N'IMPORTE QUELLE TOUCHE DU CLAVIER POUR CONTINUER, SVP~
"
CLS
        FIND SHOES
        FIND TIE;


RULE BROWN
IF      SUIT=Brown AND
        SHIRT=Tan OR
        SHIRT=White AND
        SHOES=Brown
THEN    TIE=Brown
CLS
DISPLAY"
Vous avez decide de vous habiller en tons marron.  Nous recommandons une
cravate marron ou beige pour continuer dans ces tons.  Cependant, une to
de couleur vive au cou peut faire beaucoup d'effet; une cravate jaune ou
turquoise serait tres frappante.  Si vous utilisez ces couleurs pour la
seconde or troisieme fois cette semaine, ce sera une bonne idee de chang
les couleurs de la cravate et du costume.
"
;
RULE BLUE
IF      SUIT=Blue AND
        SHIRT=Blue OR
        SHIRT=White AND
        SHOES=Black
THEN    TIE=Blue
CLS
DISPLAY"
Vous avez decide de vous habiller en bleu.  Nous recommandons une cravat
bleue pour continuer dans ces tons.  Une cravate marron est aussi un bon
choix.  Cependant, une touche de couleur vive au cou peut faire
beaucoup d'effet; une cravate rouge ou rose serait tres frappante.
Si vous utilisez ces couleurs pour la seconde or troisieme fois
cette semaine, ce sera une bonne idee de changer les couleurs
de la cravate et du costume.
"
;
RULE GRAY
IF      SUIT=Grey AND
        SHIRT=White AND
        SHOES=Black
```

```
THEN    TIE=Red
CLS
DISPLAY"
Vous avez decide de vous habiller en gris.  Nous recommandons une
cravate grise pour continuer dans ces tons.  Une cravate marron est
aussi un bon choix.  Cependant, une touche de couleur vive au cou peut
faire beaucoup d'effet; une cravate rouge ou rose serait tres frappante.
Si vous utilisez ces couleurs pour la seconde or troisieme fois cette
semaine, ce sera une bonne idee de changer les couleurs de la cravate
et du costume.
"
;
RULE WRONG_SHOES_BLACK
IF      SUIT=Brown AND
        SHOES=Black
THEN    WRONG=yes
CLS
DISPLAY"
Vous avez decide de vous habiller en tons marron.  Nous recommandons des
chaussures marrons plutot que des chaussures noires pour continuer dans
tons d'habillement.
"
;
RULE WRONG_SHOES_BROWN
IF      SUIT=Blue OR
        SUIT=Gray AND
        SHOES=Brown
THEN    WRONG=yes
CLS
DISPLAY"
Nous recommandons des chaussures noires plutot que des chaussures marron
continuer dans ces tons d'habillement.
"
;
RULE STOP
IF WRONG=yes
THEN TIE=STOP
;
RULE TRSUIT1
IF SUIT_FRENCH=Marron
THEN SUIT=Brown
;
RULE TRSUIT2
IF SUIT_FRENCH=Bleu
THEN SUIT=Blue
;
RULE TRSUIT3
IF SUIT_FRENCH=Gris
THEN SUIT=Grey
;
RULE TRSHIRT1
IF SHIRT_FRENCH=Beige
THEN SHIRT=Tan
;
RULE TRSHIRT2
```

```
IF SHIRT_FRENCH=Bleu
THEN SHIRT=Blue
;
RULE TRSHIRT3
IF SHIRT_FRENCH=Blanc
THEN SHIRT=White
;
RULE TRSHOE1
IF SHOES_FRENCH=Noir
THEN SHOES=Black
;
RULE TRSHOE2
IF SHOES_FRENCH=Marron
THEN SHOES=Brown
;
ASK SUIT_FRENCH: "Quelle couleur de costume allez-vous porter?";
CHOICES SUIT_FRENCH: Marron, Bleu,Gris;

ASK SHIRT_FRENCH: "Quelle couleur de chemise avez-vous choisie?";
CHOICES SHIRT_FRENCH: Beige,Bleu,Blanc;

ASK SHOES_FRENCH: " Quelle couleur de chaussures avez-vous choisie?";
CHOICES SHOES_FRENCH: Marron,Noir;
```

TABLE 3 -- INDUCTION TABLES FOR THE VARIABLES OF THE FASHION KNOWLEDGE BASE

TABLE TO TRANSLATE THE SHIRT COLORS INTO FRENCH

SHIRT	SHIRT_FRENCH
Tan	Beige
Blue	Bleu
White	Blanc

TABLE TO TRANSLATE THE SUIT COLORS INTO FRENCH

SUIT	SUIT_FRENCH
Brown	Marron
Blue	Bleu
Grey	Gris

TABLE TO TRANSLATE THE SHOE COLORS INTO FRENCH

SHOES	SHOES_FRENCH
Black	Noir
Brown	Marron

FIGURE 1 -- FASHION EXPERT SYSTEM, ENGLISH VERSION SESSION

FIGURE 1A -- OPENING SCREEN
FIGURE 1B -- USER INTERACTION
FIGURE 1C -- EXPERT SYSTEM ADVICE

Figure 1A

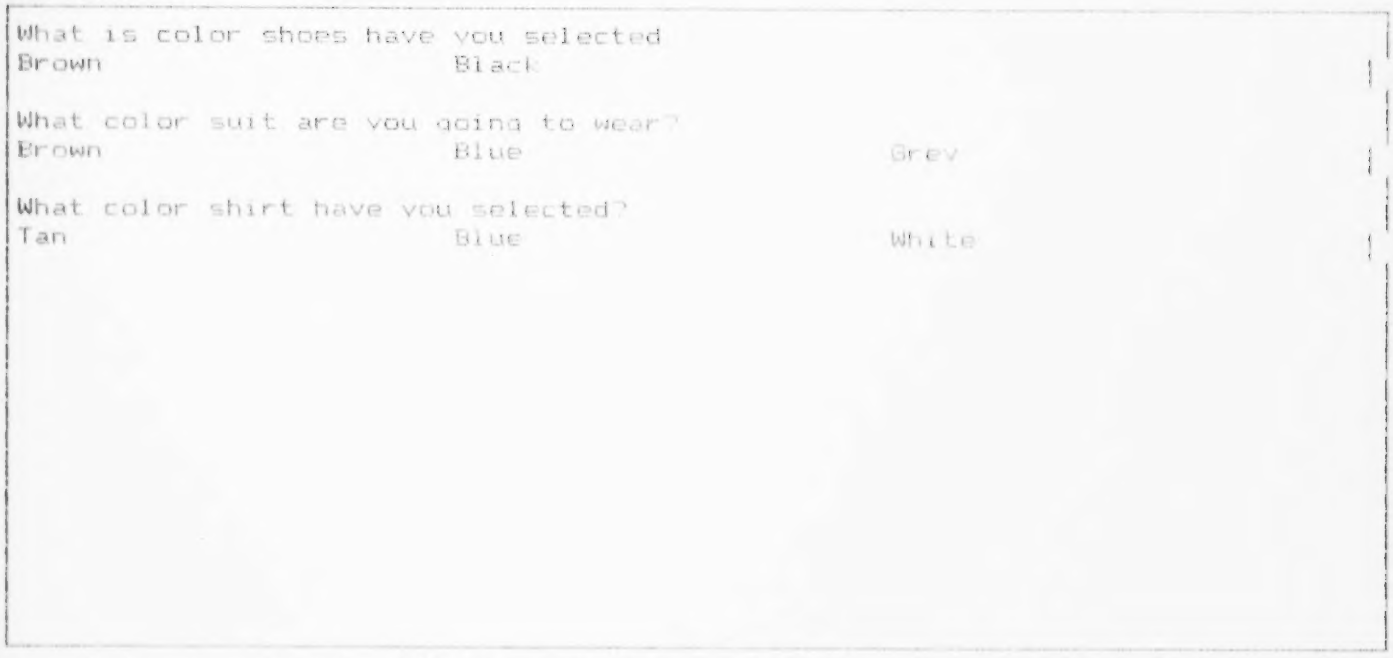
760

```
                    FRENCH FASHION EXPERT SYSTEM

          THIS EXPERT SYSTEM WILL HELP YOU DRESS FOR SUCCESS
                BY SELECTING A COLOR COORDINATED OUTFIT


Please press any key to continue
```

Figure 1 B



Enter to select END to complete /Q to Quit ? for Unknown

Figure 1C

76

```
You have decided to dress in grey..  We recommend a grey tie to
continue the color theme.  A maroon tie is another good choice.
However, a touch of color at the throat can also be very
effective, so a red or pink tie would also be striking.  If this
is the second or third time this week you are using the same
color scheme, alternate the choice of ties with your outfit.
```

```
1Help     2Go       3WhatIf   4Variable 5Rule     6Set      7Quit
Help the user
```

FIGURE 2 - FRENCH VERSION OF FASHION EXPERT SYSTEM

FIGURE 2A -- OPENING SCREEN
FIGURE 2B -- USER INTERACTION
FIGURE 2C -- EXPERT SYSTEM ADVICE
FIGURE 2D -- DEVELOPMENT SCREEN SHOWING LAST RULES FIRED AND VARIABLE VALUES (NOTE HOW THE EXPERT SYSTEM USED THE TRANSLATION RULES TO GO FROM EXTERNAL FRENCH TO THE INTERNAL VARIABLE VALUES IN THE KNOWLEDGE BASE)

·Figure 2A

764

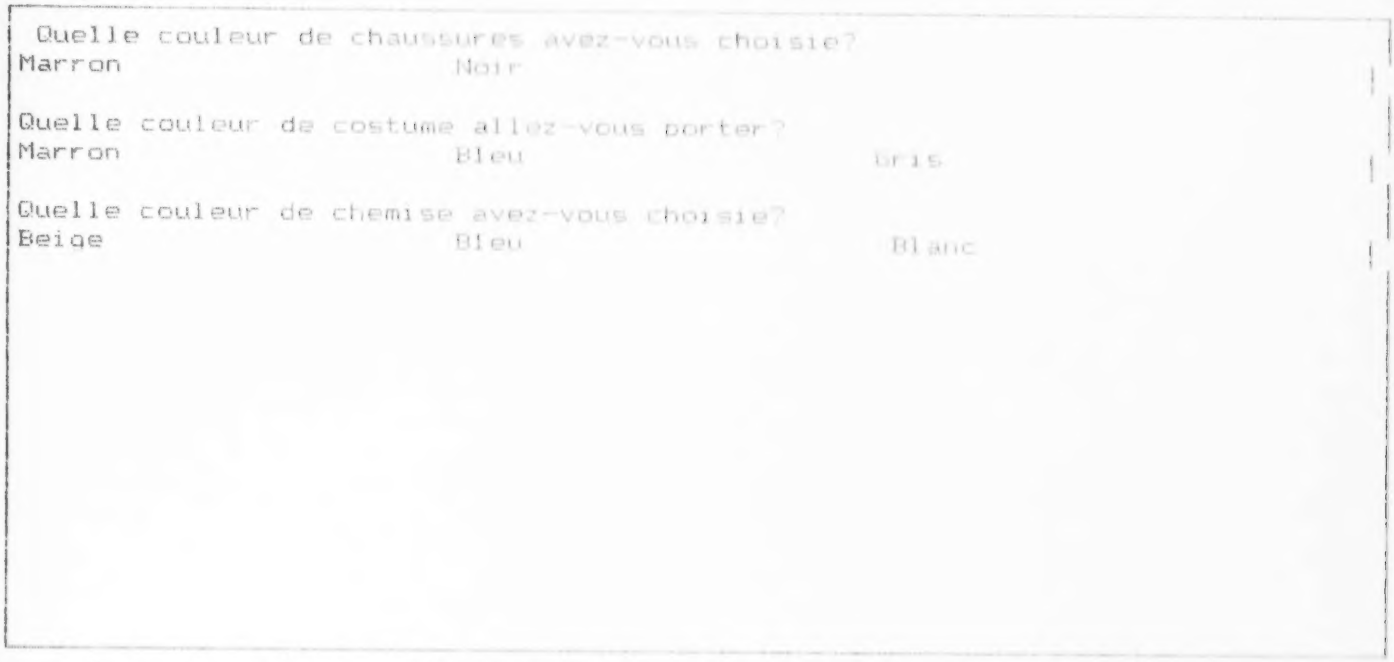
EXPERT SYSTEME POUR LA MODE FRANCAISE

CE SYSTEME EXPERT VOUS AIDERA A CHOISIR, POUR LE SUCCES DE VOS ENTREPRISES,
UN ENSEMBLE AUX COULEURS ASSORTIES

PRESSER N'IMPORTE QUELLE TOUCHE DU CLAVIER POUR CONTINUER, SVP

·Figure 2B

765



Enter to select END to complete /Q to Quit ? for Unknown

Figure 2C

Vous avez decide de vous habiller en bleu. Nous recommandons une cravate

bleue pour continuer dans ces tons. Une cravate marron est aussi un bon

choix. Cependant, une touche de couleur vive au cou peut faire
beaucoup d'effet: une cravate rouge ou rose serait tres frappante.
Si vous utilisez ces couleurs pour la seconde or troisieme fois
cette semaine, ce sera une bonne idee de changer les couleurs
de la cravate et du costume.

1Help 2Go 3WhatIf 4Variable 5Rule 6Set 7Quit
Help the user

Figure 2D

Vous avez decide de vous habiller en bleu. Nous recommandons une cravate

bleue pour continuer dans ces tons. Une cravate marron est aussi un bon

choix. Cependant, une touche de couleur vive au cou peut faire
beaucoup d'effet: une cravate rouge ou rose serait tres frappante.
Si vous utilisez ces couleurs pour la seconde or troisieme fois
cette semaine, ce sera une bonne idee de changer les couleurs
de la cravate et du costume.

```
THEN
SHIRT = Blue CNF 100

Testing TRSHIRT3

RULE TRSHIRT3 IF
SHIRT FRENCH = Blanc
THEN
SHIRT = White CNF 100
```

```
SUIT FRENCH = Bleu CNF 100

SUIT = Blue CNF 100

SHIRT_FRENCH = Blanc CNF 100

SHIRT = White CNF 100

TIE = Blue CNF 100
```

1Help 2Go 3WhatIf 4Variable 5Rule 6Set 7Quit
Help the user